Power Macintosh G4-450 Benchmark Analysis:

System Performance and Technology Trends

It is well-known that examples of peak-performance applications fine-tuned for a given processor architecture rarely translate back into a significant real-world performance increase. (When Intel launched the Pentium III, it actually turned out to be slower in certain non-optimized applications than a Pentium II-based system running the same applications at the same clock-speed.)

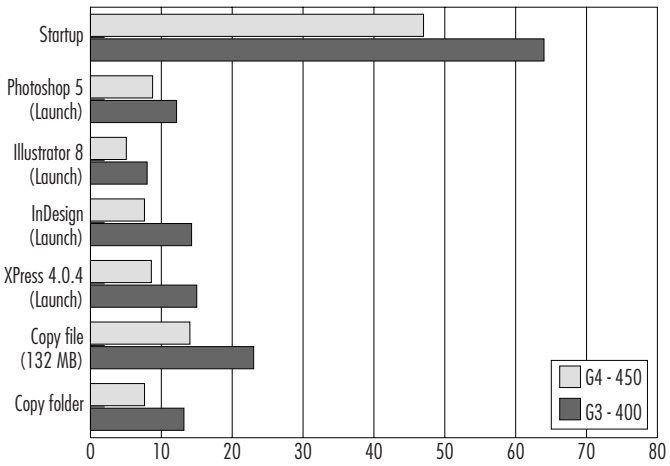
Therefore, when Apple commissioned Pfeiffer Consulting to conduct detailed, real-world benchmarks, comparing the G4-450 to other Macintosh models (including the recent G3-400 and G3-450), we were skeptical. For most standard tasks, we did not expect the system to deliver remarkable speed increases over recent models, which are themselves already quite effective and have been fine-tuned for performance.

Hardware Architecture

When one feature of a new system stands out, other aspects often get less attention from the public at large. Thus, the G4-450 represents, in most people's mind, the equivalent of near-super-computing power for high-end applications. The Velocity Engine (also known as AltiVec) does give a remarkable boost to Photoshop (see related benchmark analysis for more details). Yet, since currently only a few applications have been optimized, it is fair to say that it will not accelerate most pre-existing applications, nor more mundane system tasks.

To our surprise, the test unit Apple provided us with showed significant speed increases in basic operations, even when compared to the recent G3-400. (See benchmark figures.) There are several reasons for this. **The G4-450 benefits from**

Platform Evolution Benchmarks *show that the G4-450 system is significantly faster than previous models. Aside from the Velocity Engine, this increase can be explained by higher memory bandwidth and faster bus speed, as well as by the speed of the disk sub-system. (Time in seconds – shorter is better.)*



Major Points

- **Overall system performance of Power Macintosh G4-450 systems is clearly faster** than even recent Power Macintosh G3-400 and G3-450 models.
- Benchmarks show that **standard operations such as start-up, application launch and file copy show significant speed improvements over older systems.**
- The faster overall architecture of the G4-450 shows a **speed increase even in tasks which are not affected by the Velocity Engine nor pure processor performance.**

About the Benchmark Report

The **Power Macintosh G4-450 Benchmark Report** provides independent performance and productivity data for the new hardware platform.

Benchmarks were devised and conducted by Pfeiffer Consulting, using the **Publishing Reference Configuration™** and **Digital Imaging Reference Configuration™** defined by Pfeiffer Consulting.

For the full benchmark report and a description of benchmark m ethodology, please visit **www.pfeifferreport.com.** For more information, please contact **research@pfeifferreport.com**

Pfeiffer Consulting
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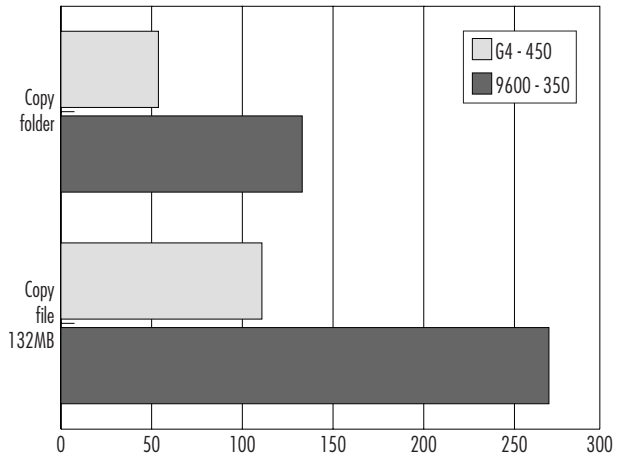
For users upgrading from older Macintosh systems, network performance should prove to be a key aspect: compared to a Power Macintosh 9600, which uses 10baseT Ethernet (as opposed to 100BaseT in the G4 models) performance more than doubles in real-world applications. (File copy using File Sharing between a Power Macintosh G4-450 and an iMac 233. Time in seconds. Shorter is better)



a new motherboard architecture that increases memory bandwidth as well as bus speed, thus allowing tasks to be accelerated which would normally run at an identical speed on an older system.

The fact that the system is well-adjusted for overall performance also shows clearly in benchmarks which call upon a variety of aspects in a system, ranging from processing power to disk sub-system performance. In most cases, users will notice performance bottlenecks linked to the speed at which the hard drive can deliver data as much or more than processor performance itself. **The choice of UltraDMA for internal storage proves to be a viable one: the G4 outperforms even a G3-450 equipped with Ultra2 LVD SCSI in copy operations** (see below).

Overall performance of the benchmark unit was excellent, which also owes a lot to the generous amount of RAM (256 MB) which is standard on the high-end model. **This is clearly the fastest Macintosh Pfeiffer Consulting has ever tested- even without looking at the performance boost delivered by the Velocity Engine to Photoshop professionals.** (Please refer to the other benchmark reports for application-specific benchmark results.)

Implications

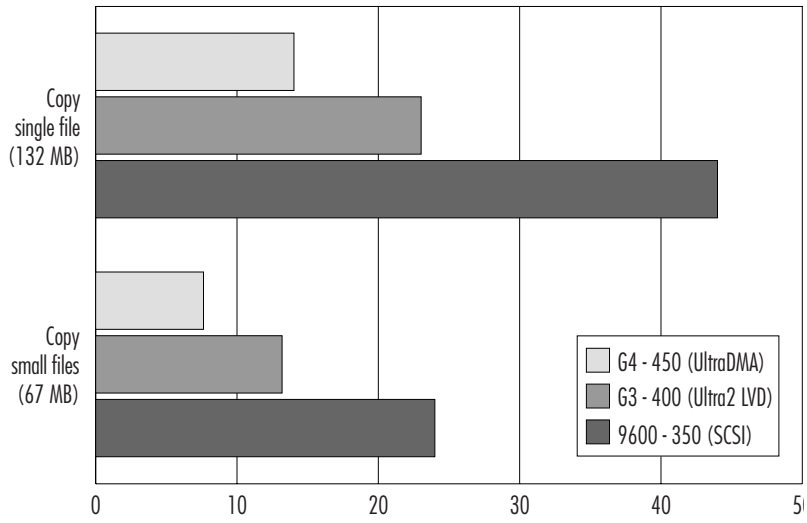
- **The G4-450 is clearly the fastest Macintosh ever released,** owing to a coherent hardware architecture as well as the standard equipment-level in terms of internal storage as well as RAM.
- **Floating-point intensive applications should yield significant performance gains** as more applications are optimized for the Velocity Engine.

Storage Technology Trends : Evolving Needs and Capacities

When analyzing Apple's strategy in high-speed connectivity, it becomes clear that the company is undergoing a fundamental shift as far as storage technology is concerned. When Apple Introduced SCSI in the mid-eighties this standard was a huge leap forward and, for a long time, the Mac's easy access to SCSI peripherals of all kinds was a great asset of the platform.

Today things have changed. **It has become necessary to distinguish between the needs for internal and external storage.** In the latter case, it is necessary to distinguish between external storage for backup, where speed is not the most important factor, and the need for high-performance RAID sub-systems in use in video, pre-press and digital imaging environments. In short, Apple seems to have separated those issues: for the user, the move to UltraDMA for internal storage makes sense. Performance is clearly superior to the SCSI systems in older Macintosh models. UltraDMA also puts the Macintosh on a price-performance parity with disks in the Windows environment. **While many users believe that UltraDMA is slower than Ultra2 SCSI, our tests show that real-world performance of internal hard-drives on Power Macintosh systems is higher on UltraDMA.** In fact, only RAID systems will use the complete bandwidth available in the fastest SCSI cards.

As far as backup and storage are concerned, USB is clearly more convenient today than SCSI. **As for high-bandwidth applications which really need the full connection bandwidth offered by Ultra2 SCSI, they only concern the very high-end of users (which should explain why Apple has stopped offering this option as a standard feature on the high-end models).** In the mid-range, FireWire should present an interesting alternative for fast connectivity, as more peripherals using this standard become available.



Performance comparison of storage technologies used in recent Macintosh models

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